

# Curriculum Vitae for Peter Willendrup

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## Education

- **1992-2000** Studies of Physics (M.Sc.) and Mathematics (B.Sc.) at the University of Copenhagen
- **2000-2002** Courses relevant to my employment at Neurobiology Research Unit
- **2002-** Courses relevant to my employment at Forskningscenter Risø Risø DTU and DTU Physics

## Employment

- **1998-1999** Physics teacher at Skt. Annæ Gymnasium for 6 months
- **2000-2002** Research assistant at Neurobiology Research Unit, Rigshospitalet
- **2002-2006** Development Engineer (Technical director of McStas) at the Materials Research Department at RISØ
- **2007-2011** Development Engineer (Technical director of McStas) at the Materials Research Department, Risø DTU
- **2012-** Senior Research Engineer, Special Advisor (Technical director of McStas) at DTU Department of Physics

## Main software projects

- **McStas** - versions 1.7, 1.8, 1.9, 1.9.1, 1.10, 1.11, 1.12, 1.12a, 1.12b, 1.12c, 2.0, 2.1, 2.2, 2.2a, 2.3, 2.4, 2.4.1, 2.5, 2.6, 2.6.1, 2.7, 2.7.1, 2.7.2, 3.0, 3.1, 3.2, 3.3 and 3.4 of the neutron ray tracing package - developed for Risø and later DTU Physics in collaboration with NBI, KU, PSI and ILL
- **McXtrace** v.1.0-1.7.1, 3.0-3.2 (- X-ray equivalent of McStas), developed for Risø and later DTU Physics in collaboration with NBI, KU and ESRF
- **d3view** - 3D visualisation package for brain images - developed for Neurobiology Research Unit. The 'Viden om' TV show on science has had two features about brain imaging and brain surgery once available in REAL video format in which d3view is used for visualisation. Also used for front cover illustrations in *Neuroimage* (1), (2), (3).
- **MARS** - *Multiple Algorithms for Registration of Scans* - image registration framework - developed for Neurobiology Research Unit

- Simulation package for investigating parameter significance in tomographic imaging - for my masters thesis
- PSD4SC - host of infrastructure for European software collaboration on single crystal diffraction with neutrons.

## Selected Publications - Neutron Scattering

1. S. Samothrakitis, M. Bertelsen, **P.K. Willendrup**, E.B. Knudsen, C.B. Larsen, N. Rizzi, L. Zanini, V. Santoro and M. Strobl; Neutron instrument concepts for a high intensity moderator at the European spallation source; Scientific Reports 2024 pp. 9360  
<https://doi.org/10.1038/s41598-024-59506-5>
2. A.R. McCluskely, P. Aulin, F. Blomsten, M. Bertelsen, C.M.C. Lobley, J. Lewis, M. Novelli, C. Somani, A. Stefanov, M. Trajanovski, N. Vaytet, **P.K. Willendrup**, JL Wynen, S Yoo, T.H. Rod; The First European Spallation Source Data Management and Software Centre Summer School; Neutron News 2024 p. 1-3  
<https://doi.org/10.1080/10448632.2024.2331387>
3. D.M. Rodríguez, **P. Willendrup**; W-T. Lee; A. Backs; F.J. Villacorta, R. Toft-Petersen, M. Morgano; Conceptual design of supermirror polarizers at the European Spallation Source; EPJ Web Conf. 286 2023  
<https://doi.org/10.1051/epjconf/202328603008>
4. W-T. Lee, J. Hagman, D.M. Rodríguez, A. Stellhorn, A. Backs. T. Arnold, E. Blackburn, P. Deen, C. Durniak, M. Feygenson, A.T. Holmes, J. Houston; S. Jaksch, O. Kirstein, D. Mannix, M. Månsson, M. Morgano, G. Nilsen, D. Noferini, T. Nylander; D. Orlov, V. Santoro, S. Schmidt, M. Schulz, W. Schweika, M. Strobl, A. Tartaglione, R. Toft-Petersen, F.J. Villacorta, **P. Willendrup**, M. Wolff, R. Woracek; Polarisation Development at the European Spallation Source; EPJ Web Conf. 286 2023  
<https://doi.org/10.1051/epjconf/202328603004>
5. M. Østergaard, E.B. Naver, A. Kaestner, **P.K. Willendrup**, A. Brüel, H.O. Sørensen, J.S. Thomsen, S. Schmidt, H.F. Poulsen, L.T. Kuhn, H. Birkedal; Polychromatic neutron phase-contrast imaging of weakly absorbing samples enabled by phase retrieval J. Appl. Cryst. (2023). 56 73-682  
<https://doi.org/10.1107/S1600576723003011>
6. M. Jamalipour, L. Zanini, E.B. Klinkby, G. Gorini, **P.K. Willendrup** Improved beam extraction at compact neutron sources using diamonds nanoparticles and supermirrors Nuclear Inst. and Methods in Physics Research, A – Volume 1033, pp. 166719  
<https://doi.org/10.1016/j.nima.2022.166719>
7. W. G. Bouwman, E. B. Knudsen, L. Udby and **P. Willendrup**; Simulations of foil-based spin-echo (modulated) small-angle neutron scattering with a sample using McStas J. Appl. Cryst. (2021). 54, 195-202  
<https://doi.org/10.1107/S1600576720015496>
8. **P. Willendrup** and K. Lefmann; McStas (ii): An overview of components, their use, and advice for user contributions, Journal of Neutron Research, pre-press 2021  
<https://doi.org/10.3233/JNR-200186>
9. **P. Willendrup** and K. Lefmann; McStas (i): Introduction, use, and basic principles for ray-tracing simulations DOI: Journal of Neutron Research, vol. 22, no. 1, pp. 1-16, 2020  
<https://doi.org/10.3233/JNR-190108>
10. T. Kittelmann, E. Klinkby, E.B. Knudsen, **P. Willendrup**, X.X. Cai, K. Kanakia; Monte Carlo Particle Lists: MCPL, Computer Physics Communications, Volume 218, September 2017, Pages 17-42, ISSN 0010-4655,  
<https://doi.org/10.1016/j.cpc.2017.04.012>

11. A. Cereser et. al. Time-of-Flight Three Dimensional Neutron Diffraction in Transmission Mode for Mapping Crystal Grain Structures, *Scientific Reports* 7, 2017, Article number: 9561
12. Schönfeldt T, Batkov K, Klinkby E.B., Lauritzen B., Mezei F., Muhrer G., Pitcher E., Takibayev A., **Willendrup P.K.**, Zanini L.; Broad spectrum moderators and advanced reflector filters using Pb-208. *Nuclear Inst. and Methods in Physics Research, A – Volume 769, Issue 1*, pp 1-4
13. Thomsena M., Knudsen E.B., **Willendrup P.K.**, Bech M., Willner M., Pfeiffer F., Poulsen M., Lefmann K., Feidenhans'l R.; Prediction of beam hardening artefacts in computed tomography using Monte Carlo simulations. *Nuclear Inst. and Methods in Physics Research, B – Volume 342, Issue 1*, pp 314-320
14. Farhi E.; Debab Y., **Willendrup P.**; iFit: A new data analysis framework. Applications for data reduction and optimization of neutron scattering instrument simulations with McStas. *Journal of Neutron Research* **17**, 2014 pp. 5-18
15. Knudsen E.; Tranum-Rømer A.; Christiansen P.; **Willendrup P.**; Lefmann K.; Investigation of propagation algorithms for ray-tracing simulation of polarized neutrons. *Journal of Neutron Research* **17**, 2014 pp. 27-34
16. **Willendrup, P.**; Farhi E.; Knudsen E.; Filges U.; Lefmann K; McStas: past, present and future. *Journal of Neutron Research* **17**, 2014 pp. 35-43
17. Farhi E.; Monzat C.; Arnerin R.; van Vuure T.; Castán-Guerrero C.; Hennane C.; Harraud P.A., G; Campioni M.; Fuard S.; Ollivier J.; **Willendrup P.**; *Journal of Neutron Research* **17**, 2014 pp. 63-74 Advanced sources and optical components for the McStas neutron scattering instrument simulation package.
18. **Willendrup, P.K.**; Cussen, L.D.; Numerical simulation study of the performance of a small neutron three axis spectrometer In: *Nuclear Inst. and Methods in Physics Research, A – 2011, Volume 637, Issue 1*, pp. 109-118
19. Klenø Kaspar H; **Willendrup, Peter K.**; Knudsen, Erik; Lefmann, Kim; Eliminating line of sight in elliptic guides using gravitational curving In: *Nuclear Inst. and Methods in Physics Research, A – 2011, Volume 634, Issue 1*, pp. S100-S103
20. Udby, L.; **Willendrup, P.K.**; Knudsen, E.; Niedermayer, Ch.; Filges, U.; Christensen, N.B.; Farhi, E.; Wells, .B.O. ; Lefmann, K.; Analyzing neutron scattering data using McStas virtual experiments In: *Nuclear Inst. and Methods in Physics Research, A – 2011, Volume 634, Issue 1*, pp. S138-S143
21. **Willendrup, Peter K.**; Udby, Linda; Knudsen, Erik; Farhi, Emmanuel; Lefmann, Kim; Using McStas for modelling complex optics, using simple building bricks In: *Nuclear Inst. and Methods in Physics Research, A – 2011, Volume 634, Issue 1*, pp. S150-S155
22. Knudsen E.; Udby L.; **Willendrup P.**; Lefmann K.; Bouwman, W.G.; McStas-model of the delft SESANS *Physica B-Cond Matt* Volume 406 p 2361 (2011)
23. Prodi, A.; Knudsen, E.; **Willendrup, P.**; Schmidt, S.; Ferrero, C.; Feidenhans'l, R.; Lefmann, Kim; A Monte Carlo approach for simulating the propagation of partially coherent x-ray beams In: *Proceedings of SPIE, the International Society for Optical Engineering – 2011, Volume 8141, Issue 1*
24. Knudsen, E.; Prodi, A.; **Willendrup, P.**; Lefmann, K.; Baltser, J.; Gundlach, C.; Del Rio, M.S.; Ferrero, C.; Feidenhans'l, R.; McXtrace: A modern ray-tracing package for X-ray instrumentation In: *Proceedings of SPIE, the International Society for Optical Engineering – 2011, Volume 8141, Issue 1*
25. H Schober, E Farhi, F Mezei, P Allenspach, K Andersen, PM Bentley, P Christiansen, B Cubitt, RK Heenan, J Kulda, P Langan, K Lefmann, K Lieutenant, M Monkenbusch, **P Willendrup**, J Saroun, P Tindemans, G Zsigmond: *Tailored instrumentation for long-pulse neutron spallation sources*, (*Nuclear Instruments and Methods A.*, **589**, (2008), 34-36.)
26. Geza Zsigmond, Sergey Manoshin, Klaus Lieutenant, Philip A. Seeger, Peter Christiansen, **Peter Willendrup**, Kim Lefmann: *Monte Carlo simulations for the development of polarized neutron instrumentation: An overview*, *Physica B*, **397**, (2007), 115-119.)

27. **Peter Willendrup**, Uwe Filges, Lukas Keller, Emmanuel Farhi, Kim Lefmann: *Validation of a realistic powder sample using data from DMC at PSI*, ICNS 2005 (Physica B, **386**, (2006), 1032.)
28. **Willendrup P.** Farhi E. Lefmann K. *McStas 1.7 - A New Version of the Flexible Monte Carlo Neutron Scattering Package*. Appeared at ECNS 2003 and 24th Risø symposium
29. Andersen P. Lefmann K. **Willendrup P.** Farhi E. *Monte Carlo Simulations as part of the Instrument Configuration in Neutron Scattering*. Appeared at ECNS 2003
30. *Popular article:* Author: **Willendrup, Peter Kjær**, Jørgensen, Mads Ry Vogel, Lefmann, Kim; Haldrup, Kristoffer; Tre tigerspring for materialeforskningen In: *Aktuel Naturvidenskab* 2015(1), p. 8-13
31. *Popular article:* Author: Lefmann, Kim; Arleth, Lise; Christensen, Niels Bech; Pape Møller, Søren; Skelboe, Stig; **Willendrup, Peter Kjær**; *Supermikroskopet ESS - DM fagligt forum* 2013
32. *Popular article:* Author: Lefmann, Kim; Arleth, Lise; Christensen, Niels Bech; Pape Møller, Søren; Skelboe, Stig; **Willendrup, Peter Kjær**; *Under motorhjælmen på supermikroskopet ESS - DM fagligt forum* 2013
33. *Popular article:* Author: Lefmann, Kim; Arleth, Lise; Christensen, Niels Bech; Pape Møller, Søren; Skelboe, Stig; **Willendrup, Peter Kjær**; *ESS: en forskningsfacilitet i verdensklasse under opbygning i Lund* In: *Kvant* 2011(1), p. 25-32
34. *Book:* S. Peggs et al (more than 400 co-authors), *ESS Technical Design Report*, ISBN 978-91-980173-2-8, Lund (S), April 2013
35. *Book(s):* **Willendrup P.** Farhi E. Lefmann K. *User and Programmers Guide to the Neutron Ray-Tracing Package McStas, Version 1.12* (Risø-R-1416(rev.ed.)(EN), 978-87-550-3679-6) - and similar manuals for older releases
36. *Book(s):* Lefmann K. **Willendrup P.** Farhi E. *Component Manual for the Neutron Ray-Tracing Package McStas, Version 1.12* (Risø-R-1538(rev.ed.)(EN), ISBN 978-87-550-3680-2) - and similar manuals for older releases

## Selected Publications - Neuroscience

1. **Willendrup P.** Svarer C. Hanson LG. Paulson OB. *A simple approach to combined inhomogeneity correction and tissue segmentation of MR MPRAGE images*. BrainPET'01. *J Cereb Blood Flow Metab* 2001;21(suppl.1):S580
2. Svarer C. **Willendrup P.** Holm. S. Pinborg L. Hasselbalch S. Paulson O.B. Knudsen G.M. *The Impact of Partial Volume Effects*. EWCBR2002
3. **Peter Willendrup**, Lars H. Pinborg, Steen G. Hasselbalch, Karen H. Adams, Karin Stahr, Gitte M. Knudsen, and Claus Svarer. *Assessment of the precision in co-registration of structural MR-images and PET-images with localized binding*, in *International Congress Series Volume 1265 , August 2004, Pages 275-280 Quantitation in Biomedical Imaging with PET and MRI. Proceedings of the International Workshop on Quantitation in Biomedical Imaging with PET and MRI*, Elsevier, 2004
4. **Willendrup P** , Svarer C, Hasselbalch SG, Knudsen GM. Comparison of Coregistration Techniques for Neuroreceptor PET images. Society of Nuclear Medicine. Society of Nuclear Medicine, 2002.
5. **Willendrup P** , Svarer C, Hasselbalch SG, Knudsen GM. Precision of Coregistration Techniques for F18-Altanserin PET Images. Cunningham VJ, Myers R. The Fourth International Symposium on Functional Neuroreceptor Mapping of Living Brain. San Diego, CA, USA: NeuroImage, 2002: S85.